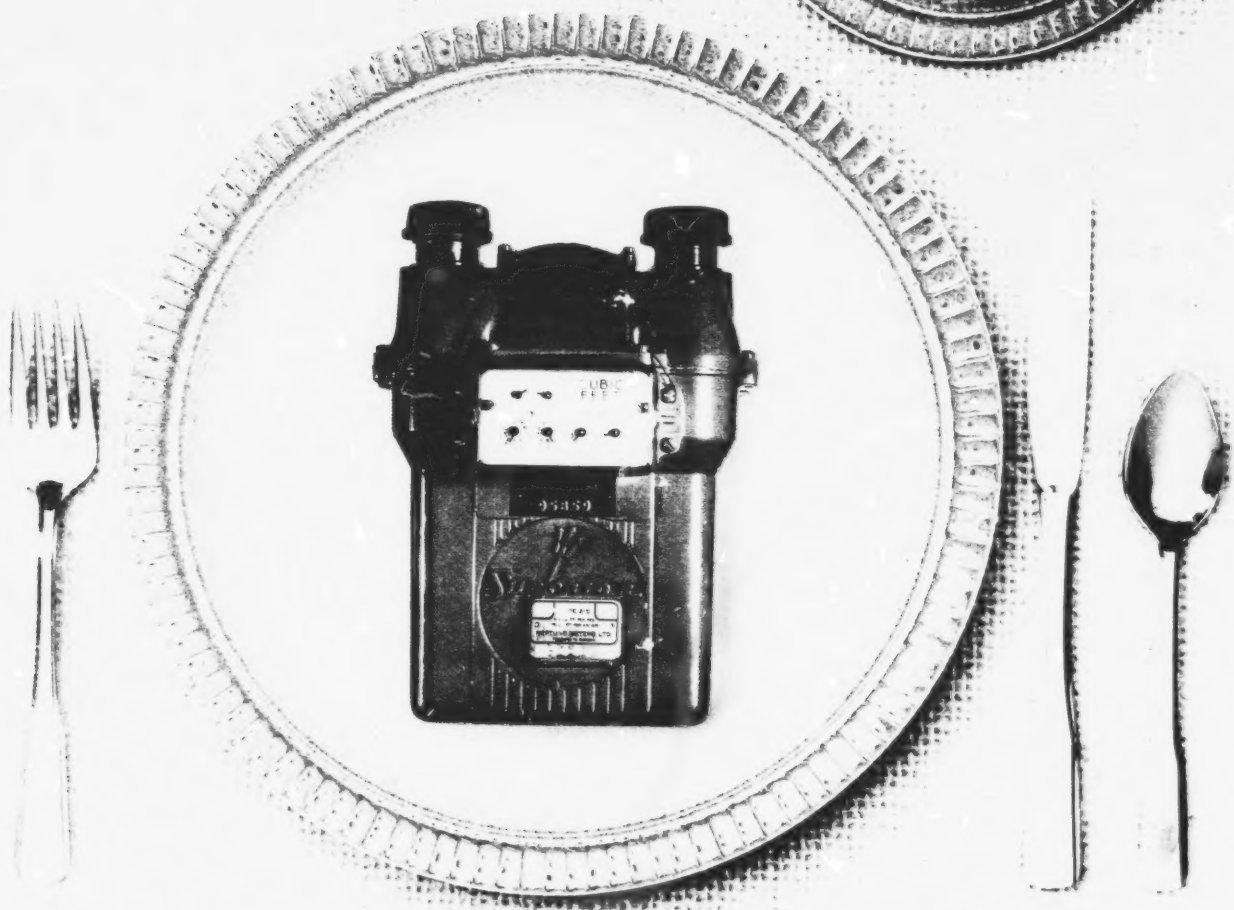
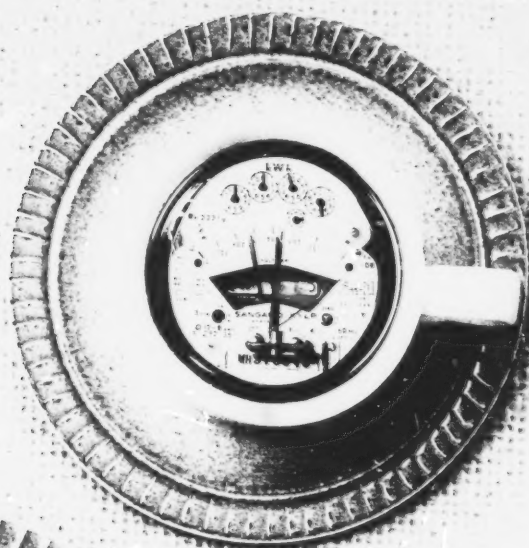


**Profit by
con\$erving
Energy
in your
Restaurant**



THE UNIVERSITY OF MANITOBA



This manual was prepared by the Department of Mechanical Engineering, University of Manitoba under contract with Energy, Mines and Resources Canada through the Building Energy Technology Transfer Program. The authors wish to thank the management of all restaurants who participated in the Restaurant Energy Management Study. Although no specific acknowledgements have been made, the cooperation and assistance from those restaurants with active energy conservation programs was significant in the development of this Energy Conservation Manual for Canadian Restaurants.

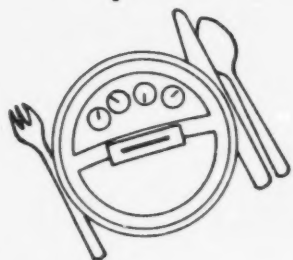
This preliminary edition precedes publication by Energy, Mines and Resources Canada in French and English for distribution to the Canadian foodservice industry.

The manual is an introduction to energy management in your restaurant. For detailed information you are invited to contact the Restaurant Energy Management Group at The University of Manitoba. The last page of this edition is a cut-out questionnaire and information request form. Forwarding this form to the following address will help us to help you with your energy management program:

Building Energy
Technology Transfer Program
For Restaurants
Department of Mechanical Engineering
University of Manitoba
Winnipeg, Manitoba
R3T 2N2

(204) 474-8281 or 474-9933

CONSERVATION MENU



FOOD FOR THOUGHT	1
MONITORING ENERGY CONSUMPTION.....	3
FOOD PREPARATION	12
HEATING, VENTILATING AND AIR CONDITIONING (HVAC)	18
THE BUILDING ENVELOPE	24
REFRIGERATION	26
HOT WATER	28
LIGHTING	30
PLANNING A NEW RESTAURANT	32

A successful energy management program is going to require some of your own energy. You will be tempted to say that keeping the lights on for an extra hour will save only a few cents and that energy management is not worth the effort. But remember conserving energy could reduce your energy bill up to 40%. In your restaurant this could represent an increased profit from 5 ¢ to 25 ¢ per customer. Still interested? Then read on and consider. . . .



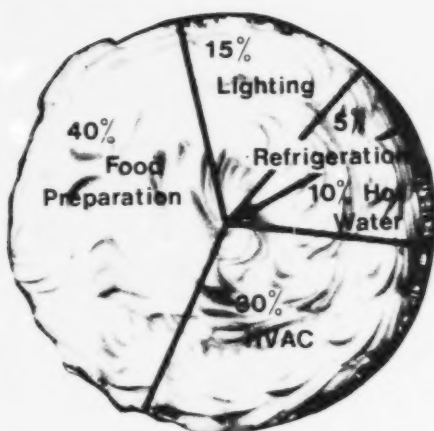
- turning off kitchen equipment (particularly the exhaust ventilation and the associated make up air unit) when it is not required.
- turning off lights when not required. Installing more efficient and lower wattage bulbs.
- establishing the minimum warm-up period for cooking equipment and inscribing the warm-up time on each piece of equipment.
- following an equipment 'start-up' and 'shut-down' schedule.
- installing timers, dimmers and other automatic devices to assist with equipment and lighting schedules.
- loading the dishwasher to capacity every time it is used.
- adding insulation to the roof of the building.
- reducing infiltration of outside air by sealing windows and weather stripping doors.
- monitoring your energy usage and recording the results of your conservation efforts.

Having made the decision to reduce the energy consumed
in your restaurant . . .

1. Assign the responsibility to one person. (If your restaurant is small, this person could be you.) Larger operations should establish an energy management committee to share the responsibility.
2. Conduct a walk-through survey of your facility using this manual as a guide (the wide margins are for your own notes) and identify those operations with potential for using less energy. You may need to contact an equipment supplier, contractor or energy consultant to fully understand the "energy" aspects of a specific piece of equipment or system.
3. Keep track of energy usage on a regular basis.
4. Set an ambitious goal. Explain the objectives of the program to your staff, asking for their help in achieving this goal. Provide positive feedback to the staff when a reduction in energy consumption is achieved. Can you think of staff incentives to promote energy conservation?



If you spend more than \$10,000/year on energy, consider contracting a professional energy management specialist to conduct an energy audit and assist you with your program.



THE ENERGY PIE

Detailed energy audits conducted in Canadian restaurants suggest that the breakdown of energy usage in your restaurant is represented by the "energy pie". Remember that the exact energy breakdown in your restaurant is affected by fuel type, climate and the type of foodservice provided.

Energy consumption and costs must be monitored just as you record the other costs in your business. It is the only way you can measure the results of your conservation effort. Think of energy as a commodity to be monitored just as you would food, beverage and labor.

The Energy Record Sheet can be used as a guide to help you develop a record keeping system for your operation. It is important to evaluate the results of your program based on the reduction in actual energy consumption, not the reduction in energy cost. If only costs were recorded, your conservation achievements could be overshadowed by the continuing escalation of energy rates.

The comparison of energy consumed by your operation from one year to another (or for that matter from one month to another) is complicated by the variation in weather conditions. Since the amount of energy consumed by your heating, cooling or ventilation system is directly related to the outside air temperature, the total energy requirement of a restaurant will fluctuate from day-to-day, month-to-month and year-to-year.





ENERGY RECORD SHEET												
	ELECTRICITY				GAS / OIL				WATER			
	CONSUMPTION (kWh)	DEMAND (kw)	UNIT (\$/kWh)	COST \$	CONSUMPTION (mcf)	UNIT COST \$/mcf	COST \$		CONSUMPTION (cu. ft.)	UNIT COST \$/cuft	COST \$	
JAN	26400	80	.028	739	2435	.363	884					
FEB	24960	77	.029	732	2017	.368	742		856	1.13	967	
MAR	24160	78	.030	725	1456	.373	543					
APR	28640	90	.029	831	1420	.384	545					
MAY	27680	96	.031	858	1399	.395	552		1037	1.24	1286	
JUNE	31840	93	.028	892	1344	.395	531					
JULY	44960	99	.024	1079	1088	.420	457					
AUG	38500	96	.026	1001	950	.430	409		1023	1.24	1269	
SEPT	36320	102	.027	981	1344	.435	585					
OCT	24960	77	.029	724	1514	.435	658		806	1.05	846	
NOV	24480	74	.028	685	2418	.420	1016					
DEC	24596	73	.028	688	2426	.420	1019					
TOTAL	357496			9926	19,810		7941		3722		4368	

Note: Water costs include sewer charges



ENERGY RECORD SHEET

	ELECTRICITY				GAS / OIL				WATER			
	CONSUMPTION (kWh)	DEMAND (kw)	UNIT (\$/kWh)	COST \$	CONSUMPTION (*)	UNIT COST (**)	COST \$	CONSUMPTION (*)	UNIT COST (**)	COST \$		
JAN												
FEB												
MAR												
APR												
MAY												
JUNE												
JULY												
AUG												
SEPT												
OCT												
NOV												
DEC												
TOTAL												

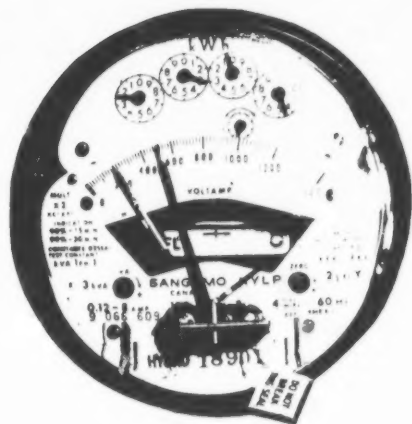
* Units of fuel or water consumption will depend on your meter or utility

** Unit Cost can be calculated by dividing the total utility cost for each month by the consumption for that month.
This unit cost is then specific to your operation and may fluctuate from month to month.

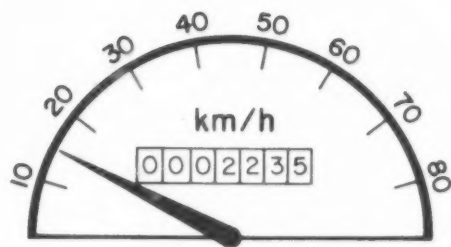
You could obtain information from the meteorological office in your area that would allow you to record the differences in weather from one period to the next. You would then apply the concept of "heating and cooling degree-days" that has been developed by engineers working in the Heating, Ventilating and Air-Conditioning field (often abbreviated as HVAC) to correlate outdoor temperature with the heating (or cooling) energy required by a building. But this would only make your energy monitoring task more difficult than it needs to be. Forget about energy comparisons with engineering accuracy and simply watch and understand the trends established as you monitor your conservation program over the next few years. Remember that a large portion of the energy used by a restaurant is for cooking and hot water heating and a significant reduction in the energy used inside your restaurant cannot be hidden by moderate differences in the weather outside.

There is another advantage to monitoring energy consumption. As you become familiar with your patterns of energy usage, a change in consumption may quickly point to equipment malfunction. For example, a time clock failure could result in the exhaust ventilation system running continuously, reflected by a sudden doubling of your gas bill.

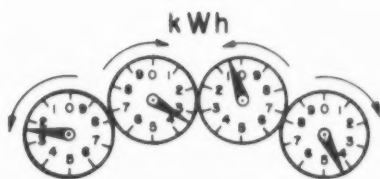
Reading and Understanding Electrical Meters



The electrical bills for most restaurants are made up of two separate components. One is the charge for the AMOUNT of energy that is consumed, while the other is a charge that reflects the peak RATE of consumption over a given period of time (referred to as "demand"). The demand-and-energy meter shown in the margin can be compared to the speedometer of an automobile.



The lower (or left hand) pointer on the electrical meter indicates the speed or rate of electrical energy consumption just as the speedometer needle tells you the speed of the vehicle. The upper (or right hand) pointer records the maximum demand that has occurred over each billing period. (The meter reader will record the peak demand and then reset the upper hand so that it contacts the lower hand. The lower hand will then reposition the upper hand at the point of peak demand occurring over the next billing period.) The units used to measure electrical demand are kilovolt amps (kVA) or kilowatts (kW). A "multiplier" (usually shown on the meter) is used by the utility to convert the meter reading to the demand shown on your bill.



The energy dials at the top of the meter add up the amount of energy consumed in the same way that the odometer adds up the miles accumulated by the vehicle. Electrical energy consumption is measured in kilowatt hours (kWh). Each dial rotates in the opposite direction to the one next to it. It is important to read the

dials from right-to-left. When the pointer on the dial is between two digits the smaller number is recorded. The correct reading for the electrical meter shown is 2304 kilowatt-hours (kWh).

POWER STANDARD

Service Charge \$8.45
 PLUS
 First 1200 kWh 9.47¢ kWh
 Next 50 500 kWh 2.97¢ kWh
 Balance 1.12¢ kWh
 PLUS
 Demand Charge
 First 50 kV A of Billing Demand* No charge
 Balance of Billing Demand* \$4.75 kV A
 Minimum Bill Demand Charge
 PLUS Service Charge

*BILLING DEMAND

- The greatest of
 (a) measured demand, OR
 (b) 80% of the highest demand
 measured in any of the previous winter
 months of November, December,
 January, February, OR
 (c) 25% of contract demand

Although the schedule for energy rates varies with each power authority, it generally is an incremented charge for each kWh used over the billing period. The electrical rate also may vary according to the time-of-day that the energy is used. The demand charge is based on the peak reading during the billing period or by another peak occurring at some other time specified by the power authority. Understandably an electrical demand schedule is rather difficult. You should contact a representative of the electrical utility for a detailed explanation of their rate structure and metering equipment. Be sure to ask about the "multiplier" for your demand meter.

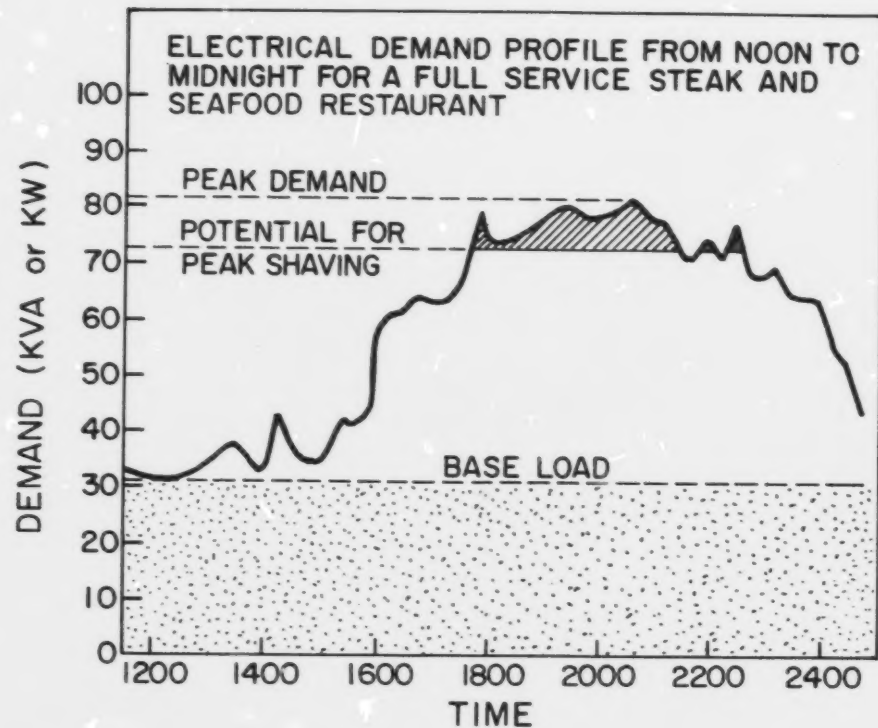
EXAMPLE RATE SCHEDULE

If your electrical bill does not show a demand charge, the meter in your restaurant probably resembles the one in your home. In this case, the charge for each kilowatt hour of electrical energy will be higher than it would if you were also billed for demand. Electrical demand control will not be a consideration in your energy management program and you can skip over to the next section on gas meters.



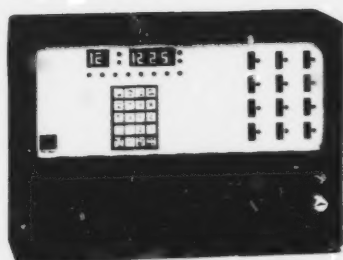
If you have a demand meter in your restaurant, controlling the peak electrical consumption is a major step to reducing energy costs.

The following figure illustrates the daily electrical load for a full service, steak and seafood restaurant.

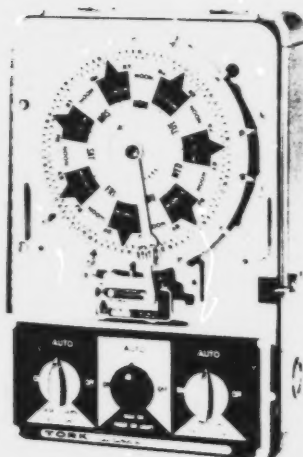


You should graph your own electrical load profile by recording the demand registered by the lower (or left hand) pointer at least once every hour on a busy day. This task will be worth the effort. You will be able to determine exactly when your peak demand occurs and then be in a position to make changes to your operation that will reduce this peak.

The steak and seafood restaurant was able to reduce their electrical demand by 10 kW, saving more than \$500 in the first year. Would a 20% reduction in your electrical demand bill justify

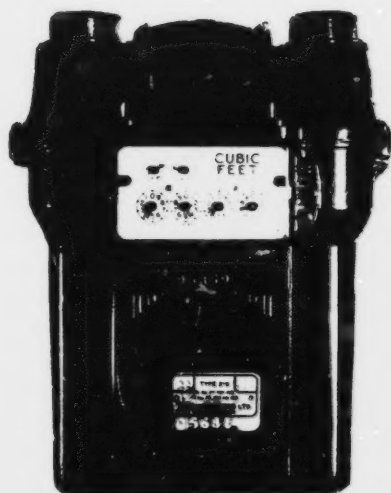


ELECTRICAL LOAD
CONTROLLER

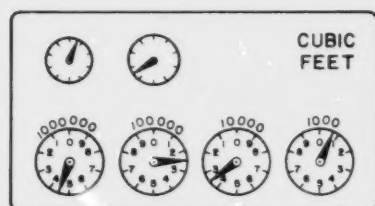


7-DAY TIME CLOCK

- following an equipment "start-up" and "shut-down" schedule? So heat the first oven up to temperature before turning the second one on. Remember that once an oven is up to temperature, the thermostat cycles the elements on and off, reducing the electrical consumption.
- turning on the air conditioning unit before the electrical peak in your restaurant occurs? Air conditioning loads are highest at start-up because the equipment must quickly reduce the interior temperature rather than simply maintain it.
- determining when pieces of equipment are being controlled automatically, so that they may be manually shut off during periods when power is required for other important equipment? Automatic "load scheduling or shedding" timers or computers may be installed to prevent unnecessary equipment from starting up during electrical demand peaks.
- scheduling energy intensive production such as baking or roasting during off-peak periods.

Reading the Gas Meter

Although the natural gas meter in your restaurant probably records in units of cubic feet, the consumption shown on the invoice may have been converted to cubic meters. The energy dials on a gas meter are read in the same manner as the kWh dials on an electrical meter. The consumption over a given period can be determined by subtracting the previous reading from the present reading. If the first digit of the present reading is a "0", add an extra "1" to the left side of the number to make the subtraction easier.

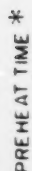


THIS METER READS : 4230

You should check with the gas company for an up-to-date price schedule and an explanation of the procedure used to calculate your bill.

Recording Oil Consumption

You won't find an energy meter if your restaurant uses oil or propane appliances. Unless you install your own meter in the fuel line, you will have to account for the consumption during a given month by referring to the invoices for that period. Calculate the average daily consumption from one "fill" to the next. Then multiply this average consumption by the number of days in the most appropriate month.



AM ————— PM ————— AM

6 8 10 12 2 4 6 8 10 12 2

* Preheat times should be considered when developing your schedule.



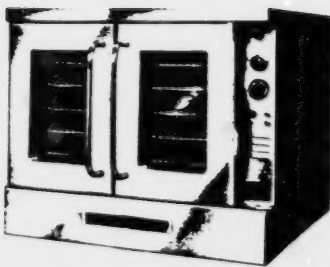
It makes sense that 30 to 50% of the Energy Pie will be eaten up by the equipment and processes used to prepare your menu. Obviously a large "piece" of your energy savings will come from the careful selection and operation of your kitchen equipment. Observe the operation of your kitchen (especially during slow hours) watching for opportunities to turn equipment off or down. If you are spending as much for energy on slow days as on busy days, you're probably not turning equipment off when you should. Determine the minimum warm-up period for each piece of cooking equipment and establish "fire-up" and "shut-down" times. Post a master EQUIPMENT SCHEDULE in a convenient location.

Which of the five basic cooking methods do you use?

1. baking or roasting
2. deep frying
3. shallow frying
4. boiling
5. steaming

Although each of these cooking methods can be carried out using different types and sizes of equipment, you must select an energy efficient "match" of the equipment to the process.

Baking or Roasting

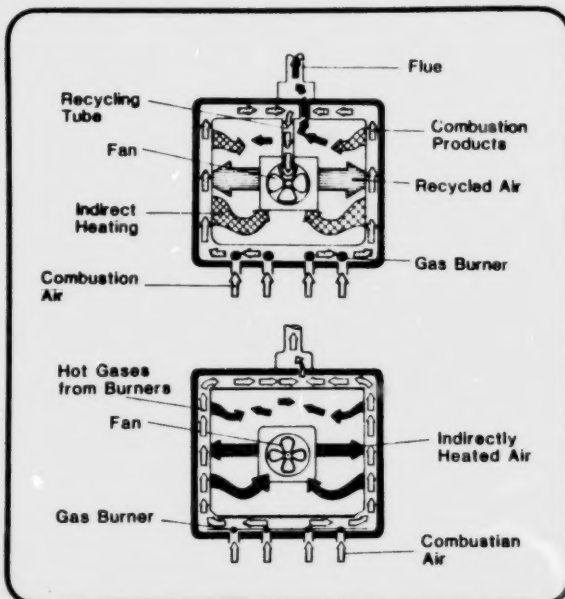


Baking or roasting is used to cook meats, poultry, fish, cakes and pies, casseroles and vegetables. The dry heat and long cooking times associated with these cooking methods impart distinct flavor and texture characteristics to the food. Unfortunately baking and roasting are the least energy efficient

of all cooking methods because the entire oven cavity must be heated to the required temperature, even for small quantities of food. Whenever possible food should be prepared using another cooking method. When baking and roasting are required to achieve a particular flavor or texture, remember . . .



- use the lowest temperature possible,
- open the oven door as little as possible,
- use meat thermometers with external oven dials,
- turn the oven off before the end of the cooking time. The heat retained in the oven will finish the cooking process.
- place meats and vegetables in a cold oven and then turn the oven on. In other words, do not preheat the oven when baking these foods.



A gas convection oven with a recycling tube (top left) is more energy efficient than an indirect-fired convection oven (bottom left).



Deep Frying

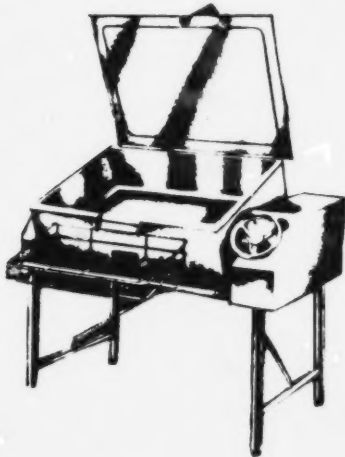
Deep frying is used mainly for cooking potatoes, chicken and battered fish. Deep frying should be done in a proper deep fryer, not in a pot on the range. Using a deep fryer will save energy and add an element of safety.

Electric deep fryers are more energy efficient than gas-fired units because the fat is in direct contact with the heating elements. Gas fryers are inefficient because they exhaust the combustion products while they are still hot. Gas-fired deep fryers should be used only in areas of the country where electricity is considerably more expensive than gas.

Do not try to save energy by lowering the fat temperature. The unacceptable food quality cannot justify any energy saving. However, energy can be conserved by . . .



- precooking foods whenever possible before frying, to shorten the frying time,
- draining food properly before frying. Large amounts of energy are required to evaporate any excess moisture on the food,
- completely covering the elements of electric deep fryers with fat to avoid losing heat to the room.



Shallow Frying

Shallow frying is used to cook a wide variety of foods; particularly breakfast items and hamburgers. The type of equipment used to fry foods has a significant effect on the amount of energy used to perform the task. The best piece of equipment to use, from an energy standpoint, is the steam-jacketed tilting skillet. However, frying can also be carried out on a griddle or in a frypan on a range. Griddles are used most frequently, but careful operation is required to avoid wasting energy. It is essential that only the portion of the griddle being used is heated, and that the cooking surface is covered as completely as possible.



Boiling

Boiling is used primarily for cooking vegetables. Although most restaurants boil vegetables in a pot on a range, it is more energy efficient to use a steam-jacketed kettle. When boiling foods energy can be conserved by . . .



- Covering the pot or steam kettle to prevent heat loss from the food.
- Reducing the heat when the food begins to boil, maintaining the liquid at a simmer, unless a rolling boil is necessary to keep foods from sticking together (e.g. pasta).
- Turning the heat off several minutes before cooking is finished. The retained heat will finish cooking the food.
- Cooking successive batches of mild-flavored vegetables in the same hot liquid.



Steaming

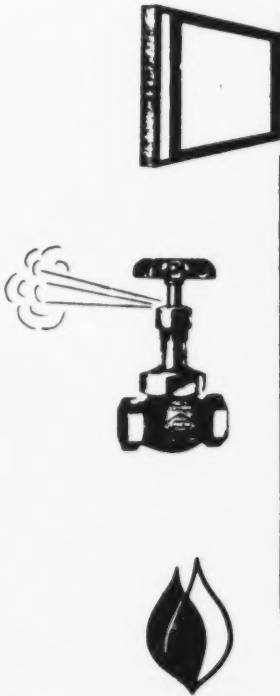
You may use steam to cook vegetables and fish or to precook other foods before deep frying. Foods requiring more than 15 minutes of cooking by other methods are prepared most energy efficiently using a pressure steamer. Frozen foods should be cooked in a convection steamer where the moving air provides faster and more even heating. Although food can also be steamed in a pot on a range - you will use more energy! Steamed vegetables have a brighter, fresher appearance and retain more of their nutrient value because of the short cooking time and small quantities of water used.

In addition to the ways of saving energy mentioned for each cooking method, there are general energy saving procedures which can be applied to all types of equipment. . . .



- Fill equipment to manufacturers recommended capacity. Partilly filled equipment uses just as much energy as full equipment.
- Turn equipment off when not in use.
- Limit preheating to the time recommended by the manufacturer. Set the thermostat at the desired temperature. Equipment will not preheat any faster if set at a higher temperature - it will only waste energy if you forget to turn it back down.

Insure that equipment is maintained according to manufacturer's recommendation and . . .



- keep the edge of equipment doors clean so that the doors will seal correctly,
- remove grease and dirt build-up from griddles, ranges and broilers to insure maximum heat transfer,
- repair all steam leaks in steam equipment properly,
- maintain proper insulation on steam lines,
- adjust and clean burner flames so that a blue flame is always evident.



A very large "piece" of the Energy Pie is consumed by the equipment used to heat, ventilate and air condition your restaurant. Fortunately you will be able to "slice" a large portion from your energy bill by maintaining and operating the HVAC system efficiently. For example, turning off a kitchen exhaust fan two hours earlier each day could save you \$700 over the heating season.

Kitchen Exhaust Ventilation

The operation of your kitchen exhaust system probably accounts for 75% of the HVAC "piece of pie". Cooking odors must be removed from the kitchen and replaced by fresh outside air. It is the energy required to heat or cool this large volume of makeup air that is significant - not the electrical energy consumed by the fan motors. If exhaust hoods are operating when the cooking equipment is not, you are wasting money.



TURN EXHAUST FANS OFF WHEN THEY ARE NOT NEEDED.

Remember that the supply of makeup air also must be reduced. (If your exhaust ventilation system is not interlocked with the makeup air unit, you may require the assistance of a mechanical engineer and contractor to install new controls.) Remember to include the operation of ventilation fans on your Equipment Schedule.

Poor planning added an extra \$3000 to the heating cost for this cafeteria!

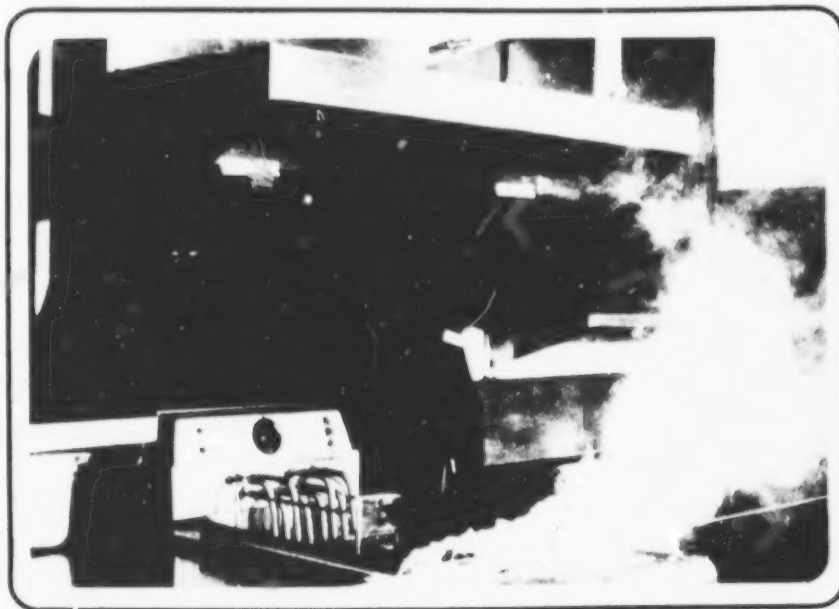


Improving the performance of your exhaust hoods is the second step. A large percentage of the air exhausted by most hoods has been short-circuited from the general kitchen area and has not been "contaminated" by the cooking process. This short-circuiting can be reduced by minimizing the open area between the hood and the cooking surface. You can use the smoke from a cigarette to observe the air flow patterns around an exhaust hood and evaluate its effectiveness in removing heat or grease laden air from the cooking process.

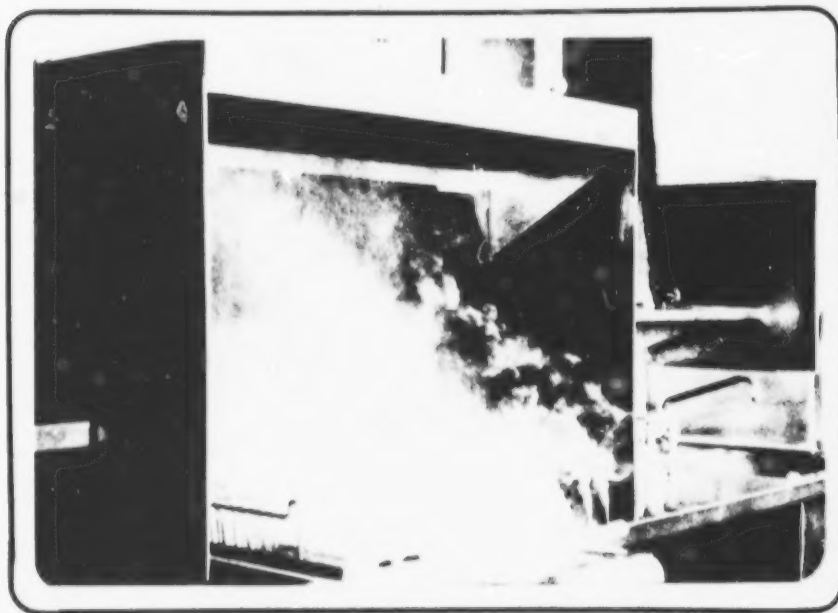


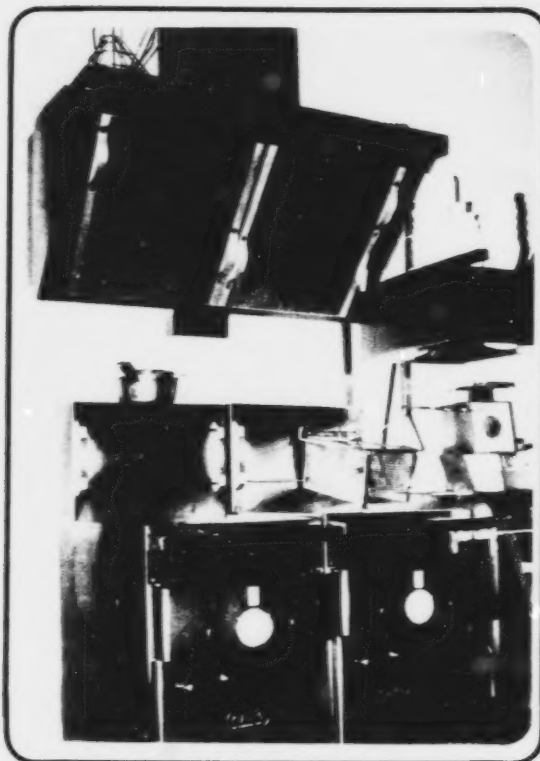
If you can improve the "performance" of an exhaust hood, it should be able to do its job using less air and less energy.

A smoke generator illustrates the operation of this exhaust hood. The adverse effect of a cross-draft on the hood's performance is clearly shown.



The installation of side curtains dramatically improved the performance of the hood. The restaurant owner was able to reduce the flow of exhaust air by 25%, saving more than \$130/year.





Do you think side curtains would improve the performance of this exhaust hood?

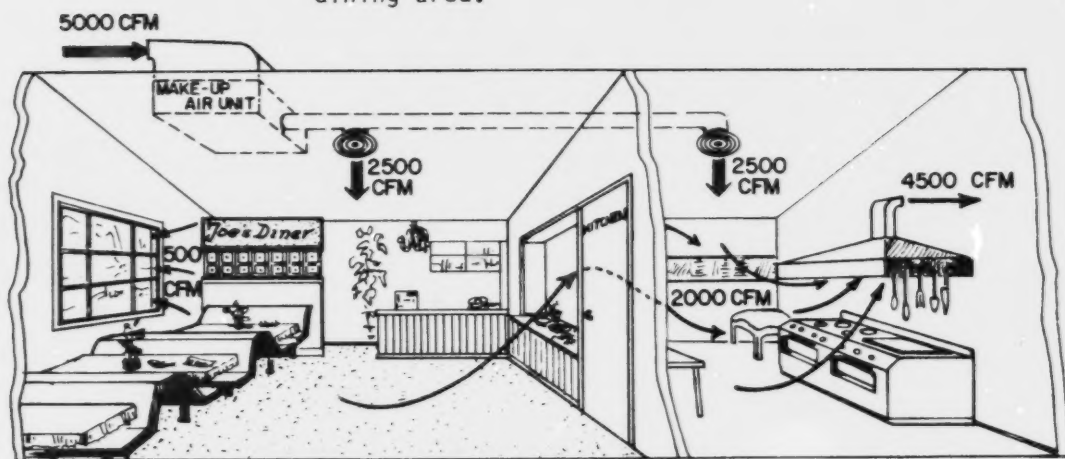
Ventilation Standards

It is important to recognize that many ventilation systems were designed before we were concerned about the cost of energy. In recent years many ventilation codes have been relaxed to accommodate the design of more energy efficient HVAC systems. Is YOUR ventilation system oversized?

CAUTION: throttling or reducing the exhaust capacity of your system could violate local fire regulations or building codes. Check with the appropriate authorities before modifying your system.

Air Balance

The proper "air balance" is an important aspect of a restaurant ventilation system. In order to keep kitchen odors from entering the dining area, a slight "negative" pressure (relative to the dining area) should be maintained in the kitchen. This is achieved by replacing only a portion of the air exhausted by the hoods directly to the kitchen space. This places the kitchen under a slight "vacuum", causing the remaining portion of the makeup air to flow from the dining area.



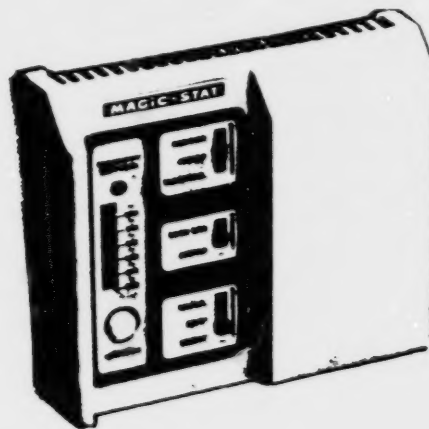
"AIR BALANCE"

The average air pressure within the restaurant should be slightly higher than the outdoor air pressure. This prevents the infiltration of unconditional air into areas where it is not desired. During winter operation this will help to eliminate uncomfortable "cold" spots. To achieve this condition, the total quantity of makeup air should be slightly greater than the quantity of air being exhausted from the restaurant.

Heating and Air Conditioning

You are well aware that lowering the thermostat setting in the winter and increasing it in the summer will reduce the heating or air conditioning costs in your home. The same applies to your restaurant.

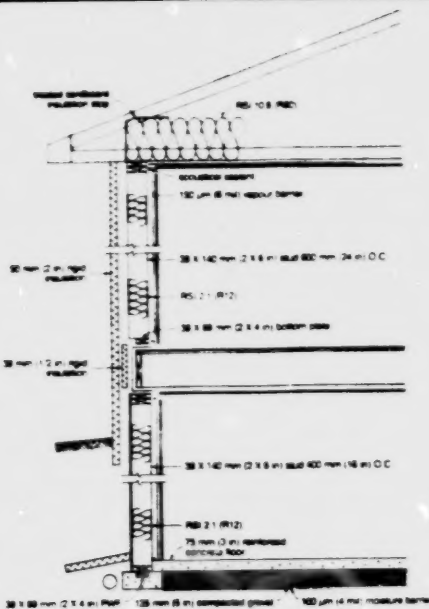
Each degree above 20°C (68°F) in the winter time could add 5% to your heating bill. Each degree below 25°C (77°F) in the summer could add 9% to your air conditioning cost.



If you do not have a 24 hour operation, consider the installation of automatic "set back" thermostats to control the HVAC system during unoccupied periods. The payback on your investment could be as low as one year.

\$

Remember that staggering the start-up of air conditioning units can reduce your peak electrical demand. If your electrical demand charges are high, and you have an electric makeup air unit, conversion to a direct fired gas unit should be considered.



THIS SCHEMATIC SHOWS THE "INSULATION" DETAIL FOR AN ENERGY EFFICIENT STRUCTURE.

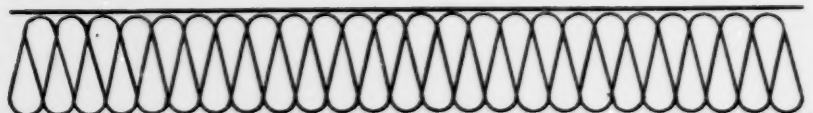


The structure of your restaurant has a direct impact on the energy consumed by the HVAC system. Although conserving energy by upgrading the insulation in the ceiling of your restaurant is not going to be as easy as shutting off an exhaust fan - it must not be overlooked. If the existing insulation is very poor, the reduction in your heating and air conditioning bills will return your investment in two or three years.

Insulation is described by its ability to resist the flow of heat. The higher this resistance or "R-Value", the lower the heat loss in winter and the lower the heat gain in summer. If you are not able to estimate the R-Value of your walls or ceiling, contact a reputable insulation firm for advice and an estimate to upgrade the existing insulation. Always obtain a quote from more than one contractor.

The cracks around doors and windows are an excellent path for heated air to escape (or cold air to enter) your restaurant. Careful weatherstripping or caulking in these areas will reduce air leakage and the associated heat loss.

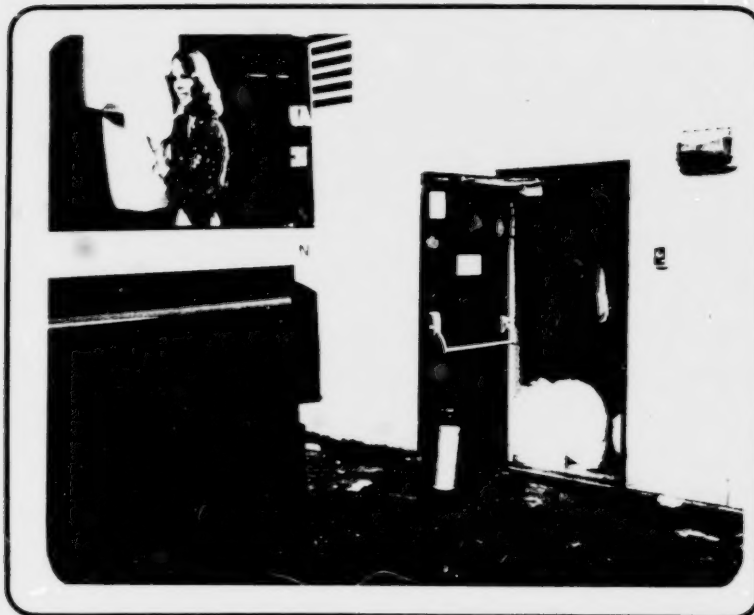
Vestibules are a very practical solution to reducing the heat loss through a doorway while preventing winter drafts in the dining area. A vestibule or porch should be large enough so that both doors do not have to be held open at the same time when one or two customers enter or leave your restaurant.



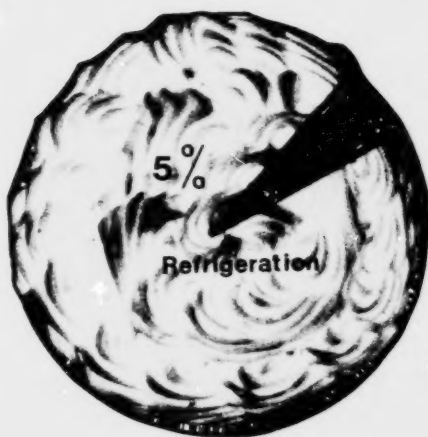
Although heating the vestibule adds a "touch of comfort", it is a very costly service. Consider relocating the heating element to the inner side of the vestibule, rather than between the doors. Otherwise, restrict the operation of the heater to extremely cold weather and only during business hours.



Stop by your local bookstore or Government Energy Information Centre and pick up one of the many publications that describe how to re-insulate your home. Much of this information will apply to restaurant construction or retrofit.



Do you heat the "Outdoors" when deliveries are made at your restaurant?



If you maintain and operate the refrigerators and freezers in your restaurant properly, they should not eat up a large piece of the Energy Pie. But what is the proper operation of a refrigeration system?

Well, here's some ideas for you and your kitchen staff . . .



- Open doors as seldom as possible. Encourage your kitchen staff to plan ahead and take several items at one time. Allow hot food to cool briefly in the room before refrigerating or freezing. Consider thawing frozen food in the refrigerator.
- Use a thermometer to assure that the thermostat for the refrigeration unit is maintaining the desired temperature.
- Consider the installation of a small loading door if traffic in and out of a walk-in freezer cannot be reduced. By allowing the freezer to be loaded without opening the main door, the heat gain to the freezer can be reduced greatly. Plastic strip cooler curtains also could be a solution to reducing the heat gain to the freezer when the door is kept open.
- Turn off the lights inside the cooler when it is not occupied. Remember that a light bulb adds heat that must be extracted by operating the refrigeration system.

While you are walking through your restaurant looking for ways to save energy, be sure to inspect the refrigeration equipment carefully.



- Do all doors close properly? Check gaskets for cracks and remove accumulated dirt or food particles from the surface. A piece of paper inserted between the gasket and door frame should resist withdrawal when the door is closed. Be sure to make this test around all sides of the door, even beside the hinges.
- Refrigerators and freezers should be level - units are designed so that the doors will swing shut by themselves. Oil hinges if doors are not closing easily.
- Are the outside refrigerator walls free from cold spots noticeable to the touch? A cold spot indicates that the insulation has shifted or is waterlogged.
- Regularly check and clean the condenser coils on the outside of the unit. A build-up of grease and dust on these coils reduces the ability of the unit to discharge the heat it has removed from inside. Do not store products in front of coils so that air flow is restricted. Although the freezer temperature is still maintained, more energy is required to maintain that temperature.

There is equipment on the market that will use waste heat from a refrigeration system to heat domestic water





Up to 10% (maybe more if you have a "bar" with a glass washer) of the Energy Pie will be required to heat domestic water in your restaurant. Unfortunately it is very difficult to monitor your "hot" water energy cost as it will be hidden in the total electricity or gas bill. However you can monitor the total water consumed (which includes hot water usage) by your restaurant operation. Don't forget that a reduction in "cold" water will also save you money. (In some Canadian cities, more than 1/3 of the cost of hot water is just for the water.)

There are two effective ways to reduce hot water energy costs. First, use less hot water to begin with, and second, keep the temperature of the hot water as low as possible. Not only will this minimize the energy in the water that goes down the drain, it will reduce the heat losses from the hot water lines and tank.

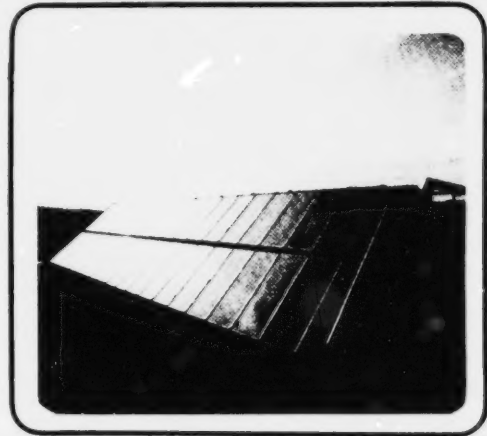


THIS RESTAURANT OWNER
INSTALLED A WATER METER
ON THE INLET LINE TO THE
HOT WATER TANK IN ORDER
TO MONITOR "HOT" WATER
CONSUMPTION SEPARATELY.



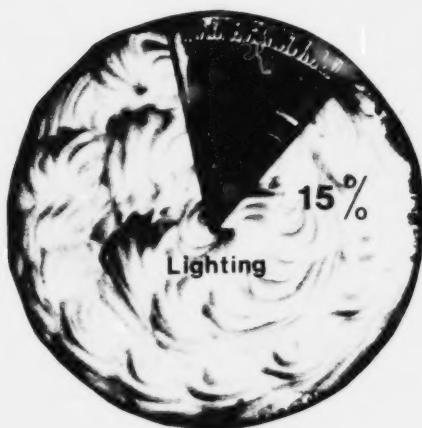
DON'T FORGET TO INSULATE
THE WATER LINES WHEN YOU
INSTALL A NEW HOT WATER
TANK !

Although you may not be able to justify the expense of a "solar" hot water heating system on top of your restaurant, it is worth your while to...



- Check that the hot water tank is set for a maximum temperature of 60°C (140°F)
- Consider installing an automatic "hot" and "cold" mixing valve in the supply line to the rest rooms. Hot water for hand washing is quite acceptable at 40°C (104°F).
- Adjust the valves beneath the washroom sinks to reduce the maximum possible flow of water from the faucets. Judge for yourself how much water is needed to wash one's hands.
- Use cold water instead of hot water whenever possible.
- Not operate the dishwasher exhaust system when your dishwasher is not being used.
- Consider the "energy saving" features when purchasing a new dishwasher. Do not select a unit that is oversized for your operation.

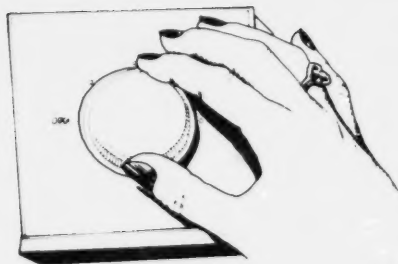




Now here is an area you can SEE where to reduce your energy costs! You can profit immediately by controlling the levels of light in your restaurant.

The atmosphere created by restaurant lighting is a marketing tool. Although you cannot sacrifice customer satisfaction for energy conservation, an effective lighting control program should benefit both concerns.

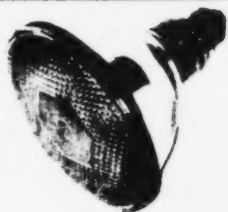
Before you make any changes to lighting, walk around your restaurant (indoors and out) noting those areas that appear to be over-illuminated. You can tell when there is adequate light without using time consuming or expensive measurement techniques. Just ask yourself if things would look right with less light. Shut off individual lights (by flipping a switch or removing a bulb) to visualize the effect of less light in a given area.



A DIMMER SWITCH COULD MAKE
A LOT OF "CENTS"

The simplest way to reduce the energy consumed by a group of lights is to shut them off if they are not needed. This may require an electrician to separate some of the light circuits. Often one set of lamps that is not needed is tied into a set that is necessary for operation of the restaurant.

Another easy solution is to simply remove (or loosen) unnecessary light bulbs. Although this may not be acceptable for decorative fixtures, it may work well for a row of ceiling lights or in areas only occupied by staff.



Incorporate lighting control as part of your restaurant Equipment Schedule and Employee Education Program.

As you walk around your restaurant, remember . . .



SODIUM LAMPS ARE ONE OF THE MOST EFFICIENT SOURCES OF LIGHT

- Light colors reflect light; dark colors absorb light
- Conventional fluorescent lamps are about four times more efficient than standard incandescent lamps. (And there are low wattage fluorescent lamps now on the market.)
- Timers and dimmers can be used to reduce lighting costs. Use a solid state dimmer, not a resistance type.
- If you remove a fluorescent bulb you must also disconnect the ballast.
- Shut off lights in the parking area after business hours. Energy efficient sodium lights are an alternative to incandescent lighting.
- Use natural lighting when practical. Select drapes and louvres that allow comfortable, natural lighting in your restaurant.



THE MANUFACTURER OF THIS ENERGY SAVING LIGHT BULB CLAIMS THAT IT ONLY CONSUMES 30% OF THE ENERGY USED BY A STANDARD INCANDESCENT BULB.

If you are planning to rennovate your facilities or build a new restaurant, keep in mind that your restaurant designer may not have low energy costs as a major design criteria. But then, the designer does not pay your energy bills! You should review all plans carefully and make the decisions on energy conserving alternatives.

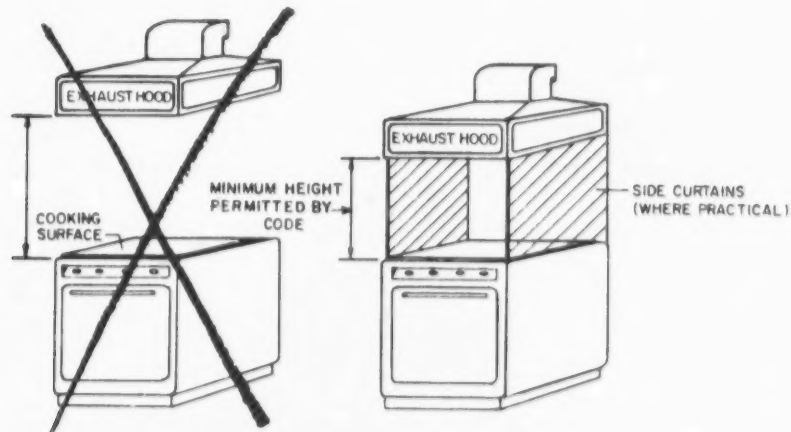


THE INOVATIVE DESIGN OF A
"LOW VOLUME - HIGH VELOCITY"
DISHWASHER EXHAUST SYSTEM
USES LESS ENERGY THAN A
"LARGE DUCT" DESIGN.

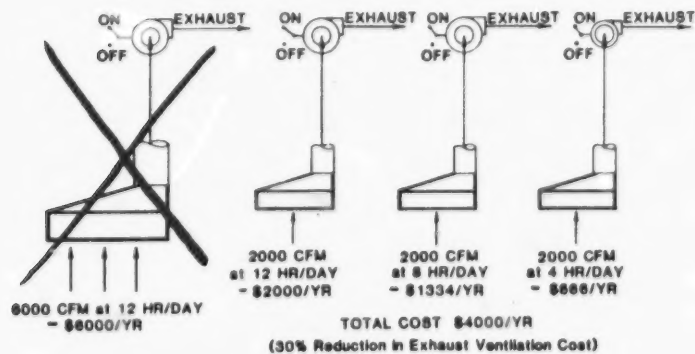
HVAC

Heating and air conditioning equipment should be carefully chosen and sized for your particular operation. (Oversizing can reduce the operating efficiency due to the increased "on-off" cycling of the units.) You must emphasize to your consultant that you wish to minimize the operating cost of your exhaust ventilation system. It is possible to design a system that can be "fine tuned" (using variable speed fans, changing pulleys on the fan drive, or installing air dampers) during the initial operation of your restaurant. The ventilation rate selected should be a minimum for your operation. You do not need a ventilation system that has been oversized so that it could work in any restaurant.

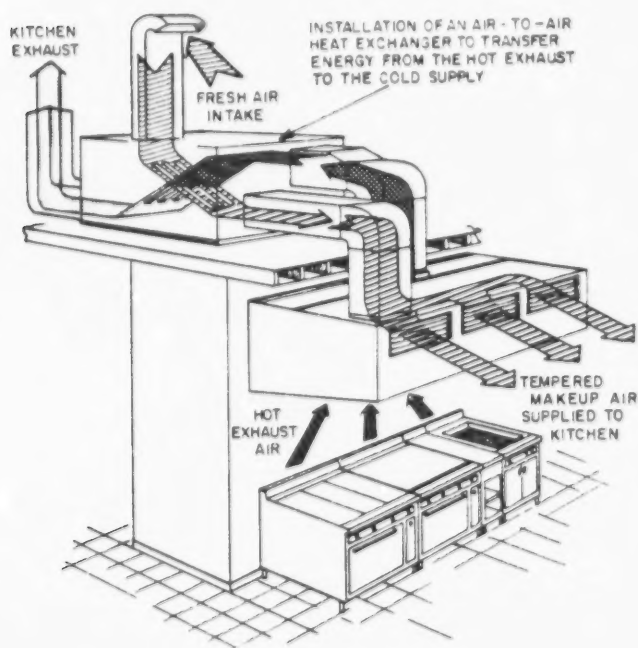
Ensure that kitchen exhaust hoods are installed as close as possible to the cooking surface and that the open area between this hood and the cooking surface has been minimized as much as possible.



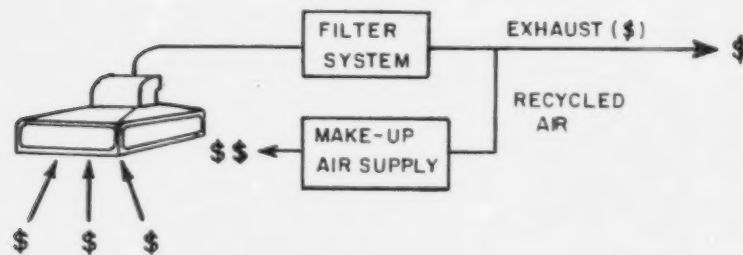
If more than one kitchen exhaust hood is required, consider installing separate fans and controls for each hood. This will allow individual hoods to be shut-off along with the associated cooking equipment. The make-up air supply must also be controlled to match the exhaust ventilation rate. (In large commercial kitchens up to 75% of an exhaust system can be seen operating over cooking equipment that is not being used.)



Air-to-air heat exchangers are another alternative to recovering some of the energy that is exhausted from your restaurant. Although these systems can effectively reduce the cost of heating the make-up air by more than 50%, the economics of installing such equipment in your restaurant should be analyzed very carefully. Determine the installed and operating costs of the equipment when calculating the system payback. The economics of heat recovery are also sensitive to the actual operating time of a system. (It may be more cost effective to shut an exhaust system off when it is not needed than it is to install expensive heat recovery equipment.)



If your restaurant is in a community which requires odour pollution control, you may have to install an elaborate filtration system for the kitchen exhaust. If such a system is installed, it may be possible to recirculate a large portion of the exhaust air back into the kitchen.



Cooking Equipment

Select cooking equipment so that a large appliance will not need to be used to cook a small quantity of food.



Remember most manufacturers of restaurant equipment have developed energy conserving models and these models should be considered.

Also . . .



- Select insulation levels that are equivalent to those promoted for energy efficient homes.
- Consider orienting the entrances and windows according to prevailing winds and solar heating. Ensure that primary entrances have effective vestibules.
- Heat recovery from wastewater to preheat domestic water is feasible. Packaged systems may be on the market in the near future.
- Consider the installation of additional energy meters for various functions in your restaurant operation. (e.g. cooking equipment, space heating, hot water heating.)
- Lighting circuits and layouts should be designed for reduced energy consumption.
- Consider electronic and mechanical methods of reducing your electrical equipment power demand. (load shedders or timers).
- Remember that it is always more expensive to retrofit energy conserving equipment than it is to design the system properly in the first place.

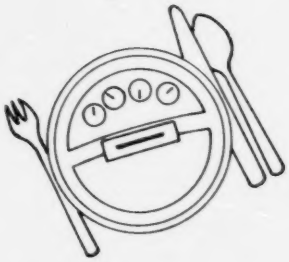


And . . .



PROFIT

BY SERVING
YOUR ENERGY PIE
CAREFULLY!



Questionnaire and Information Request

A. General

(1) Restaurant name _____

(2) Address _____

(3) Restaurant Type _____

licensed, unlicensed, fast food, take-out,
cafeteria, etc.

(4) Manager/Owner _____

B. Utilities

Usage & Costs (for a recent 12 month period)

	Usage (units)	Cost \$
(1) Electricity	_____	_____
(2) Natural Gas	_____	_____
(3) Heating Oil	_____	_____
(4) Water	_____	_____

C. Other Restaurant Data

- (1) Number of Customers/year _____
- (2) Size of Restaurant
(floor area) _____
- (3) Hours of Operation _____
- (4) Average Cost/Customer* _____

* The average expenditure per customer in your restaurant.

D. Further Information

- (1) Do you have an energy management program? _____
- (2) Do you feel there is a potential for savings in
energy costs in comparison to other areas? _____
- (3) Would you make use of a slide/tape presentation
on different aspects of energy management if
they were made available to you? _____
- (4) If you have any questions regarding energy management in your
restaurant or would like to receive additional information
that would assist with your energy conservation program
complete this form and send to:

Building Energy
Technology Transfer Program
For Restaurants
Department of Mechanical Engineering
Room 230, Engineering Building
University of Manitoba
Winnipeg, Manitoba R3T 2N2